CHAIR EQUIPPED WITH LUMBAR SUPPORT UNIT

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to a chair, and more particularly to a chair equipped with a lumbar support unit in which the lumbar support unit attached to a lower portion of a backrest part is automatically protruded or bulged forwardly to snugly support a lumbar region of a user when the backrest part is tilted rearwardly, and restored to its normal position when the backrest part is erected, thereby affording convenient operation and protection of a lumbar region of a user.

Description of the Prior Art

In general, a chair, which is equipped with a backrest adapted to be tilted rearwardly when a user inclines the backrest rearwardly to take a rest, and to be restored to its normal position when the user erects his/her upper body to work, is widely used. In chairs including seats and backrests which are integrally operated as well as such chairs having tilting backrests, when a user stretches his/her upper body rearwardly, a backrest is tilted rearwardly by the rearward movement of the upper body. In the stretched position, since there is left a space between the lumbar region of the user and

the chair without an additional lumbar support portion, the user cannot take comfortable rest. Even though there is an additional lumbar support part provided on a backrest, a user must manipulate a handle to operate the additional lumbar support part into a desired position regardless of tilting and restoring operations of the chair. Accordingly, the chair is inconvenient to users.

SUMMARY OF THE INVENTION

Accordingly, the present invention has been made keeping in mind the above problems occurring in the prior art, and an object of the present invention is to provide a chair equipped with a lumbar support unit which is adapted to be automatically protruded depending on an inclination of the chair to more comfortably support a lumbar region and thus spine of an user, thereby providing the user with improved convenience, comfortable rest and health enhancement.

It is another object of the present invention to provide a chair equipped with a lumbar support unit, which can be controlled in its protruding degree by a user.

It is still another object of the present invention to provide a chair equipped with a lumbar support unit, which is adapted to be easily operated.

In order to accomplish the above objects, the present

invention provides a chair equipped with a lumbar support unit, in which the lumbar support unit includes a lumbar plate attached to a lower portion of a tiltable backrest part, and an actuating connector comprising a connecting wire which is connected at its one end to an upper end of the lumbar plate and is connected at its other end to a chair frame supporting the seat and back parts, and a connecting tube surrounding the connecting wire, which is positioned at one end at a location downwardly spaced from the one end of the connecting wire, and is connected at the other end to a movable frame.

BRIEF DESCRIPTION OF THE DRAWINGS

The above and other objects, features and other advantages of the present invention will be more clearly understood from the following detailed description taken in conjunction with the accompanying drawings, in which:

Fig. 1 is a schematic perspective view of a chair equipped with a lumbar support unit according to a first embodiment of the present invention;

Fig. 2 is a schematic longitudinal cross-sectional view of the chair of Fig.1;

Fig. 3a is a cross-sectional view showing an operation of the lumbar support unit when a seat-back shell is tilted rearwardly;

Fig. 3b is a cross-sectional view showing an operation of the lumbar support unit when a seat-back shell is restored to its normal position;

Fig. 4 is an enlarged cross-sectional view of an upper part of the lumbar support unit of Fig. 1;

Fig. 5 is a cross-sectional view of wire control means coupled to an end of a connecting wire;

Fig. 6 is an enlarged view showing both ends of a connecting tube, which are locked;

Fig. 7a is a cross-sectional view of a chair equipped with a lumbar support unit according to a second embodiment of the present invention, in which a seat-back shell is tilted rearwardly;

Fig. 7b is a similar view to Fig. 7a, in which the seat-back shell is restored;

Fig. 8a is a cross-sectional view of a chair equipped with a lumbar support unit according to a third embodiment of the present invention, in which a seat-back shell is tilted rearwardly;

Fig. 8b is a similar view to Fig. 8a, in which the seat-back shell is restored;

Fig. 9 is a cross-sectional view of a chair equipped with a lumbar support unit according to a fourth embodiment of the present invention;

Fig 10a is a cross-sectional view showing an operation of

the lumbar support unit of Fig. 9, in which a movable frame is tilted rearwardly;

Fig. 10b is a similar view to Fig. 10a, in which a movable frame is restored;

Fig. 11a is a cross-sectional view of a chair equipped with a lumbar support unit according to a fifth embodiment of the present invention, in which a movable frame is tilted; and

Fig. 11b is a similar view to Fig. 11a, in which a movable frame is restored.

DETAILED DESCRIPTION OF THE INVENTION

A chair equipped with a lumbar support unit according to the present invention will be described in further detail by way of example with reference to the accompanying drawings.

Referring to Fig. 1, there is a chair "A" equipped with a lumbar support unit according to the present invention. As shown in the drawing, the chair "A" includes a L-shaped seat-back shell 1, which comprises a seat part 10, and a backrest part 11 integrally formed with the seat part 10. The seat-back shell 1 is joined to a known chair frame 2 to be tilted rearwardly. When a user inclines the seat-back shell 1 rearwardly so as to take a rest, the seat-back shell 1 is tilted into a proper rearwardly inclined position. On the other hand, when the user erects his/her upper body to work,

the seat-back shell 1 is again restored to a normal position by elastic force of a spring (not shown). The backrest part 11 of the sea-back shell 1 of the chair "A" according to the present invention is provided at its front and lower portion with the lumbar support unit 3, which is intended to be protruded forwardly when the seat-back shell 1 is tilted rearwardly, and to be resiliently retracted to a normal condition when the seat-back shell 1 is again restored to its normal position.

Although the seat-back shell 1 is shown to be comprised of the seat part 10 and the backrest part 11, which are integrally formed, the seat part 10 and the backrest part 11 may be formed separately from each other, as indicated by dotted lines in Fig. 1.

As shown in Figs. 2 to 3b, the lumbar support unit 3 comprises a lumbar plate 31 attached to a lower portion of the backrest part 11 of the seat-back shell 1 which is adapted to resiliently bend or spread out, and an actuating connector 32 for actuating the lumbar plate 31 according to an operation of the seat-back shell 1, which is connected at its end to an upper end of the lumbar plate 31, extended downwardly and connected at the other end to the chair frame 2 to which the seat-back shell 1 is joined. The lumbar plate 31 is shaped by a leaf spring having excellent resilience. Although the lumbar plate 3 is shown to be naked showing its structure, the lumbar plate 3 is normally provided at its outer surface with a cover

(not shown).

Referring to Fig. 4, there is shown the lumbar support unit 3. As shown in the drawing, the lumbar plate 31 of the lumbar support unit 3 is provided at its upper end with a pair of angled brackets 311, which are extended toward the backrest part 11. A shaft 312 is rotatably supported by the pair of angled brackets 311, opposite ends of which are provided with rollers 313 so that the lumbar plate 31 can be smoothly slid upward and downward. The rollers 313 are slidably guided by a pair of guide rails 315, which are formed at a rail plate 314 attached to the backrest part 11 and longitudinally extended. The lumbar plate 31 is connected at its lower end to a hinge bracket 121 of a support frame 12 attached to the backrest part 11, and is slidably guided by the rail plate 314 at its upper end.

The support frame 12 is formed at its middle portion with a through hole 122 through which the actuating connector 32 passes, and is coupled at its lower end to a movable frame 21 of the chair frame 2.

The actuating connector 32 comprises a connecting wire 32a which is connected at upper end to the shaft 312 of the lumbar plate 31 and connected at the lower end to a fixed plate 221 rearwardly extended from a fixed frame 22 to which the movable frame 21 of the chair frame 2 is hingedly coupled, and a flexible connecting tube 32b into which the connecting wire 32a

is extended, and which is fixed at its upper end to the backrest part 11 via a holding bracket 327 such that the upper end of the connecting tube 32b is positioned at a location somewhat spaced from the upper end of the connecting wire 32a and is positioned at its lower end adjacent to an actuating plate 211 of the movable frame 21.

The connecting wire 32a of the fixed plate 221 is provided at its lower end with wire control means 321, which is capable of controlling a protruding degree of the lumbar plate 31 by increasing or decreasing a length of the connecting wire 32a.

As shown in Fig. 5, the wire control means 321 comprises an adjusting bolt 322 integrally formed with the lower end of the connecting wire 32a, and an adjusting nut 323 placed on the fixed plate 221, into which the adjusting bolt 322 is threaded. Although the adjusting bolt 322 is shown to be provided with a wire-fixing end 324, which is intended to grip the end of the connecting wire 32a, the wire-fixing end 324 can be omitted. With the aid of the wire control means 321, when the adjusting nut 323 is rotated to raise the adjusting bolt 322, a length of the connecting wire 32a between the fixed plate 221 and the upper end of the lumbar plate 31 is decreased by a length corresponding to a raised height of the adjusting bolt 322, thereby tightening the connecting wire 32a and thus causing the lumbar plate 31 to be resilienty bulged. Accordingly, since the lumbar plate 31 is protruded from a retracted position when

the backrest part 11 is tilted rearwardly, the protruded lumbar plate 31 is further resiliently bulged. In contrast, when the adjusting bolt 322 is lowered by the reverse rotation of the adjusting nut 323, a length of the connecting wire 32a between the fixed plate 221 and the upper end of the lumbar plate 31 is increased by a length corresponding to a lowered height of the adjusting bolt 322, thereby loosening the connecting wire 32a. Therefore, the bulged lumbar plate 31 is somewhat reduced in a protruded degree.

The connecting wire 32a is passed through a through hole 211a of the actuating plate 211 and then fixed to the fixed plate 221 of the fixed frame 22. The lower end of the connecting tube 32b is fixed to a lower surface of the actuating plate 211. The upper end of the connecting wire 32a, which is fixed to the lumbar plate 31, is positioned to be spaced from the upper end of the connecting tube 32b by a certain exposed distance "L" in its uppermost position. It is preferable that the exposed distance "L" of the connecting wire 32a is equal to or longer than a vertical travel distance of the actuating plate 211 of the movable frame 21. If the exposed distance "L" of the connecting wire 32a is shorter than the vertical travel distance of the actuating plate 211, the connecting wire 32a is applied with excessive load, causing problems such as breaking of the wire.

As shown in Fig. 6, the lower end of the connecting tube

32b is coupled to the actuating plate 211 in such a way that the lower end of the connecting tube 32b is provided with a male threaded portion 325 and the male threaded portion 325 is threaded into two fastening nuts 326 with the actuating tube 211 between the two fastening nuts 326. On the other hand, the other upper end of the connecting tube 32b is coupled to the holding bracket 327 attached to the backrest part 11 in such a way that the upper end of the connecting tube 32b is formed with a male threaded portion 325 and the male threaded portion 325 is threaded into two fastening nuts 326 with the holding bracket 327 between the two fastening nuts 326.

Operations of the chair "A" according to the present invention will now be described. As shown in Fig. 3a, when a user inclines the seat-back shell 1 rearwardly to take a rest, both the seat part 10 and the backrest 11 are tilted concurrently. At this point, since the movable frame 21, on which the seat part 10 is mounted, is inclined downwardly at its rear portion and thus the actuating plate 211 attached to the rear portion of the movable frame 21 is lowered while pushing the lower end of the connecting tube 32b of the actuating connector 32, the connecting wire 32a is drawn with respect to the lower end of the connecting tube 32b, thereby downwardly pulling the upper end of the lumbar plate 31 to which the upper end of the connecting wire 32a is connected. Accordingly, as the upper end of the lumbar plate 31 is pulled

down by the tensioned connecting wire 32a, the elastic lumbar plate 31 is protruded or bulged forward while the rollers 313 move along the guide rails 315 of the rail plate 314, thereby snugly supporting a lumbar region of a user. The bulging motion of the lumbar plate 31 is halted and maintained in position when the tilting of the seat-back shell 1 is completed. As shown in Fig. 3b, when the seat-back shell 1 is returned to the normal position, the movable plate 211, which is in a state of pressing the connecting tube 32b of the actuating connector 32, is raised, so that the tensioned condition of the connecting wire 32a is released resulting in raising of the upper end of the connecting wire 32a. With the raising of the connecting wire 32a, the protruded lumbar plate 31 is spread out by its resilience and restored to the normal almost straight position while the rollers 313 of the lumbar plate 31 move upward along the guide rails 315.

Figs. 7a and 7b show a chair "A" equipped with a lumbar support unit according to a second embodiment of the present invention, which is more simplified by omitting the rollers of the above-described first embodiment. In this embodiment, the lumbar plate 31 is protruded forward when the seat-back shell 1 is tilted rearwardly, and restored to its normal position when the seat-back shell 1 is again erected to be upright, as in the first embodiment.

Figs. 8a and 8b show a chair "A" equipped with a lumbar

support unit according to a third embodiment of the present invention. In this embodiment, the connecting wire 32a of the actuating connector 32 is connected at its upper end to the lower end of the lumbar plate 31. From the lower end of the lumbar plate 31, the connecting wire 32a is upwardly extended and then curved downwardly through a hole of the backrest part 11. When the seat-back shell 1 is tilted rearwardly by an upper body of a user, the movable frame 21, on which the seat part 10 is mounted, is downwardly inclined at its rear portion. Hence, the actuating plate 211 attached to the rear portion of the movable frame 21 is lowered while pushing the lower end of the connecting tube 32b of the actuating connector 32, so that the connecting wire 32a is drawn with respect to the lower end of the connecting tube 32b, thereby upwardly pulling the lower end of the lumbar plate 31 to which the upper end of the connecting wire 32a is connected. Accordingly, as the lower end of the lumbar plate 31 is pulled up by the drawn connecting wire 32a, the elastic lumbar plate 31 is protruded forward, thereby snugly supporting a lumbar region of a user. The bulging motion of the lumbar plate 31 is halted and maintained in the position when the tilting of the seat-back shell 1 is completed. On the other hand, when the seat-back shell 1 is returned to the normal position, the movable plate 211, which is in state of pressing the connecting tube 32b of the actuating connector 32, is raised, so that the tensioned

condition of the connecting wire 32a is released. Therefore, the protruded lumbar plate 31 is spread out by its resilience and restored to the normal almost straight position.

Fig. 9 shows a chair "A" equipped with a lumbar support unit according to a fourth embodiment of the present embodiment, which is provided with a fixed seat part and a tiltable backrest part which are formed separately from each other. The fixed frame 22, on which the seat part 10 is mounted, is provided with the movable frame 21 which is hingedly connected thereto at its front end. The movable frame 21 is attached with the separate backrest part 11. The backrest part 11 is provided at its lower portion with the lumbar support unit 3, which is adapted to be protruded forwardly when the movable frame 21 is inclined, and is resiliently restored to its normal position when the movable frame 21 is again erected upright.

The lumbar support unit 3 comprises a lumbar plate 31 attached to the lower portion of the elastic backrest part 11, which can be bulged forwardly, and an actuating connector 32 for causing the lumbar plate 31 to be protruded and spread out according to motion of the movable frame 2, which is connected at its upper end to the upper end 31a of the lumbar plate 31 and extended downwardly. The lower end of the actuating connector 32 is connected to the movable frame 22, to which the movable frame 2 is hingedly connected.

The actuating connector 32 comprises a connecting wire 32a which is connected at its upper end to a upper end of the lumbar plate 31, and connected at its lower end to a fixed plate 22, and a flexible connecting tube 32b into which the connecting wire 32a is extended, and which is fixed at its upper end to the backrest part 11 such that the upper end of the connecting tube 32b is positioned at a location spaced from the upper end of the connecting wire 32a and is connected at its lower end to a lower portion of the movable frame 21 or the fixed frame 22. In this embodiment, the lower end of the connecting tube 32b is connected to the lower portion of the movable frame 21. Furthermore, although the actuating connector 32 is illustrated to be comprised of the connecting wire 32a and the connecting tube 32b, the actuating connector 32 may be comprised of only the connecting wire 32a.

The upper end of the connecting wire 32a, which is fixed to the lumbar plate 31, is positioned to be spaced from the upper end of the connecting tube 32b by a certain exposed distance "L" in a normal position. It is preferable that the exposed distance "L" of the connecting wire 32a is equal to or slightly longer than a maximum spacing "L'" defined between the fixed frame 22 and the movable frame 21 when the movable frame 21 is most inclined. If the exposed distance "L" of the connecting wire 32a is shorter than the maximum spacing "L", the connecting wire 32a is applied with excessive load, causing

problems such as breaking of the wire 32a.

Operations of the chair "A" according to the fourth embodiment of the present invention will now be described. When a user inclines the backrest part 11 and thus the movable frame 21 rearwardly to take a rest, the movable frame 21, which is hingedly connected to fixed frame 22, is inclined downwardly to cause the spacing "L'" to be longer. At this point, the connecting wire 32a is drawn with respect to the lower end of the connecting tube 32b, thereby downwardly pulling the upper end of the lumbar plate 31. Accordingly, as the upper end of the lumbar plate 31 is pulled down by the connecting wire 32a, the elastic lumbar plate 31 is protruded or bulged forward, thereby snugly supporting a lumbar region of a user. The bulging motion of the lumbar plate 31 is halted and maintained in the position when the tilting of the backrest part 11 and thus the movable frame 21 is completed. When the movable frame 21 is returned to the normal position, the spacing "L'" is reduced, allowing the tensioned condition of the connecting wire 32a to be released. Therefore, the protruded lumbar plate 31 is spread by its resilience and restored to the normal position.

Figs. 11a and 11b show a chair "A" according to a fifth embodiment of the present invention, which is substantially similar to the chair of the fourth embodiment except that the upper end of the connecting wire 32a of the actuating connector

32 is connected to the lower end of the lumbar plate 31. In this embodiment, when a user inclines the backrest part 11 and thus the movable frame 21 rearwardly to take a rest, the movable frame 21, which is hingedly connected to fixed frame 22, is inclined downwardly to cause the spacing "L'" to be longer. At this point, since the upper end of the connecting wire 32a is drawn upwardly, pulling the lower end of the lumbar plate 31 upwardly, the elastic lumbar plate 31 is protruded or bulged forward, thereby snugly supporting a lumbar region of a user. The bulging motion of the lumbar plate 31 is halted and maintained in position when the tilting of the movable frame 21 is completed. When the movable frame 21 is returned to the normal position, the tensioned condition of the connecting wire 32a is released. Therefore, the protruded lumbar plate 31 is spread by its resilience and restored to the normal position.

As described above, the present invention provides a chair equipped with a lumbar support unit, in which the lumbar support unit is automatically protruded or bulged forwardly to snugly support a lumbar region of a user when a backrest part is tilted rearwardly, and restored to its normal position when the backrest part is erected. Accordingly, the chair of the present invention can afford convenient operation and protection of a lumbar region of a user.

Although the preferred embodiments of the present invention have been described for illustrative purposes, those

skilled in the art will appreciate that various modifications, additions and substitutions are possible, without departing from the scope and spirit of the invention as disclosed in the accompanying claims.